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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,329	09/10/2004	David M. Hoffman	GEMS8081.221	5328

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EXAMINER	
SONG, HOON K	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 05/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/711,329	HOFFMAN ET AL.	
	Examiner	Art Unit	
	Hoon Song	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh (US 5416815) in view of Mazor et al. (US 2002/0001365A1).

Regarding claim 1, Hsieh teaches a photon counting (PC) radiographic system comprising:

a radiographic energy detector (16) configured to detect radiographic energy passing through an object to be imaged (column 2 line 42) and having a given flux rate and output electrical signals indicative of the detected radiographic energy (column 3 line 45) and

a PC channel connected to receive the electrical signals and sample the electrical signals in a sampling window and provide a photon count output (column 3 line 45-52); and

However Hsieh fails to teach a control operationally connected to the PC channel and configured to automatically adjust the sampling window at least as a function of the given flux rate.

Mazor teaches a photon counting radiographic system having a control operationally connected to a PC channel and configured to automatically adjust the

sampling window (sensitivity) at least as a function of the given flux rate (paragraph [0053]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the radiographic system of Hsieh with the sampling controller as taught by Mazor, since the controller of Mazor would avoid high x-ray saturation so that overall detection noise would be reduced (paragraph [0050]).

Regarding claim 2, Mazor teaches the control is further configured to decrease the sampling window with an increase in the given flux rate (paragraph [0053]).

Regarding claim 3, Mazor teaches the control is further configured to increase the sampling window with a decrease in the given flux rate (paragraph [0053]).

Regarding claim 4, Mazor teaches a feedback loop between the photon count output and the control, and wherein the control is further configured to determine the given flux rate based on photon count data received across the feedback loop (since the sensitivity of the channels is automatically controlled, it is considered that the controller has the feedback loop).

Regarding claim 5, Mazor teaches the control is further configured to adjust an energy level threshold based on an adjustment of the sampling window to accept photons with acceptable energy levels (paragraph [0054]).

Regarding claim 6, Hsieh teaches the radiographic energy detector is configured to detect radiation energy with a wavelength less than 10 nanometers (x-rays).

Regarding claim 7, Hsieh teaches the radiation energy detector is configured to detect x-ray energy (x-rays).

Regarding claim 8, Hsieh teaches a CT system comprising :

a rotatable gantry (12) having a bore (figure 1) centrally disposed therein;

a table (36) movable fore and aft through the bore and configured to position a subject (15) to be imaged for CT data acquisition;

a radiographic energy projection source (13) positioned within the rotatable gantry (12) and configured to project radiographic energy (x-ray) toward the subject (15); and

a detector assembly (16) disposed within the rotatable gantry (12) and configured to detect radiographic energy projected by the projection source (13) and impinged by the subject (15), the detector assembly (16) including:

a detector element (18) configured to output electrical signals indicative of detected radiographic energy attenuated by the subject (15);

a PC channel (24) operationally connected to the detector element and configured to count a number of photons of the detected radiographic energy.

however Hsieh fails to teach a shaping time controller operationally connected to the PC channel and configured to control a variable shaping time in near real-time based on the photon output count data.

Mazor teaches an x-ray detector controller having a shaping time controller operationally connected to a PC channel and configured to control a variable shaping time in near real-time based on the photon output count data (paragraph [0053]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the radiographic system of Hsieh with the shaping controller as

taught by Mazor, since the controller of Mazor would avoid high x-ray saturation so that overall detection noise would be reduced (paragraph [0050]).

Regarding claim 9, Hsieh teaches the radiographic energy includes x-ray energy, and wherein the table (36) is designed to position a medical patient (15) within the bore (figure 1).

Regarding claim 10, Mazor teaches the shaping time controller is further configured to shorten the variable shaping time as the number of photons counted increases (paragraph [0053]).

Regarding claim 11, Mazor teaches the shaping time controller is further configured to lengthen the variable shaping time as the number of photons counted decreases (paragraph [0053]).

Regarding claim 12, Hsieh teaches the number of photons counted is a function of flux of the radiographic energy received by the radiographic energy received by the detector element (column 3 line 45).

Regarding claim 13, Mazor teaches the shaping time controller is further configured to control the variable shaping time to prevent saturation of the PC channel (paragraph [0053]).

Regarding claim 14, Mazor teaches the variable shaping time defines a balance between charge integration time and channel recovery time (paragraph [0053]).

Regarding claim 15, Mazor teaches a low-noise, high-speed charge amplifier (36);

a signal shaper (73) operationally connected to the low-noise, high-speed charge amplifier designed to extract individual photon events;

an energy level discriminator (74) operationally connected to the signal shaper and designed to identify a photon energy for each photon event; and

a photon counting element (76) operationally connected to the energy level discriminator and designed to count the number of photons for a number of photon identified energies.

Regarding claim 16, Mazor teaches an energy level controller operationally connected to the shaping time controller and designed to accept photon events for counting having acceptable energy levels (figure 3).

Regarding claim 17, Mazor teaches the energy level controller is further designed to assure linear energy response independent of the variable shaping time and/or the number of photons counted (paragraph [0053]).

Regarding claim 18, Hsieh teaches a method comprising the steps of:

monitoring flux of radiation energy that has passed through an object to be imaged (column 3 line 45), the radiation energy having a number of photons received by a photon counting, radiation energy detector, the detector designed to sample a photon charge cloud within a given sampling window and count the number of photons (column 3 line 45-47).

However Hsieh fails to teach a method of comparing a current flux on the radiation energy detector to a base flux level corresponding to the given sampling

window; and adjusting the given sampling window to correspond to the current flux based on the comparison.

Mazor teaches a method of preventing radiation energy detector saturation by comparing a current flux on the radiation energy detector to a base flux level corresponding to the given sampling window (paragraph [0035]); and adjusting the given sampling window (sensitivity) to correspond to the current flux based on the comparison (paragraph [0035]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the method of Hsieh with controlling method as taught by Mazor, since the controlling method of Mazor would avoid high x-ray saturation so that overall detection noise would be reduced (paragraph [0050]).

Regarding claim 19, Mazor teaches the step of adjusting includes the step of lengthening the given sampling window if a level of the current flux is less than the base flux (paragraph [0035]).

Regarding claim 20, Mazor teaches the step of adjusting includes the step of shortening the given sampling window if a level of the current flux is more than the base flux (paragraph [0035]).

Regarding claim 21, Hsieh teaches the step of monitoring includes the step of receiving an indication of the number of photons counted by the radiation detector (column 3 line 45).

Regarding claim 22, Mazor teaches the step of automatically adjusting an energy level threshold in response to an adjustment of the given sampling window (paragraph [0035]).

Regarding claim 23, Hsieh teaches the step of data processing and reconstructing an image of a subject and wherein the image includes tissue differentiation (column 3 line 37-39).

Response to Arguments

Applicant's arguments with respect to claims 1-7 and 18-23 have been considered but are moot in view of the new ground(s) of rejection.

In response to applicant's argument that one having ordinary skill in the art would not be motivated to replace the detector assembly of Hsieh with one of the type used for XRR, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In this case, Hsieh teaches a CT system having a photon counting detector and Mazor also teaches an x-ray system having a photon counting detector. It is known in the art that these photon counting detectors have saturation problems. Accordingly, one having ordinary skill in the photon counting detector art would be motivated to adapt the photo count detector of Hsieh with the photon counting sampling control of Mazor in order to avoid the saturation problem so that overall detection noise would be reduced (paragraph [0050]).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 9:30 AM - 7 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HKS

5/15/06
HKS

EDWARD J. GLICK
PATENT EXAMINER